



White Paper **KVM for the Enterprise**

WHAT'S INSIDE

How administrators can have the network at their fingertips - no matter where they are

EXECUTIVE SUMMARY

Large distributed enterprises and competitive business requirements have created new demands for effective monitoring and management of multiple platforms, network hardware and other devices. Network administrators must also keep up with advancing technical issues within networks that range from small LANs to lights-out operations around the globe. To ensure that their businesses stay on top, managers responsible for complex networks have turned to digital IP-based KVM switching systems, which eliminate distance restrictions, increase the number of users supported, and enhance security.

Digital IP-based KVM not only meets security and reliability requirements, but also provides flexibility for rapid expansion or reconfiguration. Such standards-based systems can easily pay for themselves by leveraging existing network infrastructures.

INTRODUCTION

Network administrators face new challenges in managing both the scale and scope of distributed enterprises. Business processes require accelerating computing and communications capabilities. Connecting multiple server platforms as well as numerous routers, power management units and other serial devices requires centralized management. Server farms and lights-out operations place premiums on the ability to monitor and control a multiple device network infrastructure with a single management tool.

Business demands for growth and flexibility also complicate network administration. New network devices must be added constantly to accommodate new technologies or expanded requirements. Evolving organizational or other requirements make reconfiguration a daily priority, and expectations for responsiveness have never been greater. Despite these requirements for growth and flexibility, the imperatives of network administration—security, reliability and cost-effectiveness have not changed.

To meet the challenges of such complexity, network administrators have adopted two strategies: centralization and standardization. Centralization eliminates redundant devices and leverages existing IT staff, allowing companies to cost-effectively support distributed networks. 'Flexible' centralization actually moves with staff, giving companies greater coordination and control, speeding responsiveness to changing business requirements and enhancing security. Standardization can be seen in the near-universal acceptance of IP as a communications standard and the drive toward computing standards within organizations. Standardization is also sought in other areas as well, such as cabling.

The advantages of IP connectivity within LAN and WAN environments are well known. IP networks are scalable. New devices can be dynamically added by just assigning a new IP address. Additionally, IP networks offer substantial flexibility. Almost any device or platform can be accommodated within an IP network. These platforms and devices can also be easily reconfigured according to changing business or other requirements with minimal impact on other nodes. Finally, the technical requirements of IP networks are well understood.

Despite numerous advantages, IP networks can create network management issues. The primary one is, of course, security. The same openness that makes IP networks scalable and flexible also creates potential doors for intruders. IP networks add a level of complexity when they must co-exist with legacy proprietary protocols and/or analog signaling systems. Such issues have stalled drives toward standardization and centralization at some organizations.

The impact of standardization and centralization

To help achieve centralization of control, network managers turned to KVM (keyboard, video and mouse) switching systems. Now a fixture in most Network Operating Centers (NOC), KVM switches evolved from the impracticality of having separate keyboards, monitors and mice for each platform within a server room.

Although analog KVM units helped simplify administration of high-density server racks, distance limitations required placement near servers, handicapping their utility. The number of users able to be supported also was limited. Such limitations restricted the ability of network administrators to centrally control and scale distributed networks.

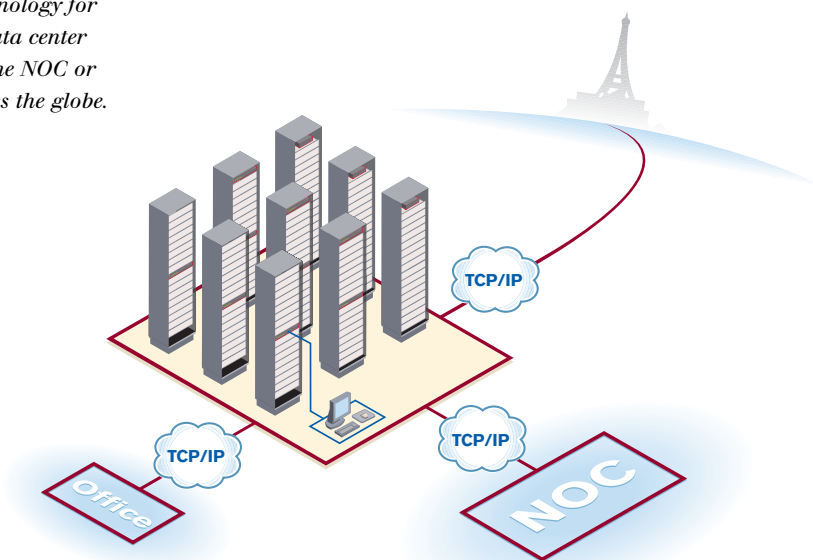
Early analog KVM units did not meet organizational demands for standardization. Also, scaling to large numbers of servers required complex reconfigurations. These units required proprietary cables and software. Additionally, analog KVM cabling created a tangle and consumed valuable real estate.

As a result, network administrators are adopting digital IP-based KVM systems as part of a drive toward standardization and flexible centralization. Not only do such systems overcome the limitations of traditional analog KVM systems, they also deliver substantial benefits for managing heterogeneous distributed networks.

Instead of depending on proprietary cables and signaling systems, IP-based KVM systems leverage existing Ethernet and other IP networks. To ensure routability, KVM systems must use true IP protocols, rather than using an IP network to merely carry proprietary analog signals.

Such IP-based connectivity delivers four major advantages. First, it leverages existing infrastructure. No longer is there any need to overlay proprietary connections to ensure control and communications for local and remote management. Second, IP-based connectivity removes distance and other limitations of analog KVM systems - thus the 'flexible' centralization. Since digital KVM signaling is based on the IP protocol, network administrators can control servers and other devices in the data center-or across the globe, from any computer with a Web browser. It also means that almost any number of users and devices can be added or altered without complex reconfiguration. Finally, client software can leverage IP technology to provide substantial administrative control. This control includes session sharing, monitoring of server status, keyboard emulation of multiple platforms and centralized logging. Such software also supports administrative flexibility with macros, windows-resizing and graphical representations of KVM appliances and attached servers.

As shown in the illustration, this solution combines the power of digital and analog technology for access and control of data center devices at the rack, in the NOC or from any location across the globe.



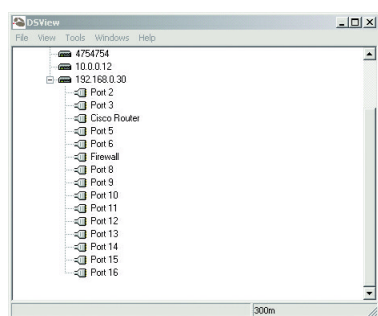
IP-based KVM systems also enhance security despite the openness of IP networks. DES encryption, bolstered by multiple levels of centralized network control based on the Windows® NT security model, provides network-level security. Permissions and access levels can be set per user down to individual devices.

To meet the need of controlling multiple devices within distributed networks, some companies have installed remote control software on target devices. Such software enables network administrators to both issue commands and retrieve performance and other information. However, these software-only solutions require that the operating system already be loaded on the target device. Often, the most critical network issues arise when the operating system has not loaded, so software solutions are of little help.

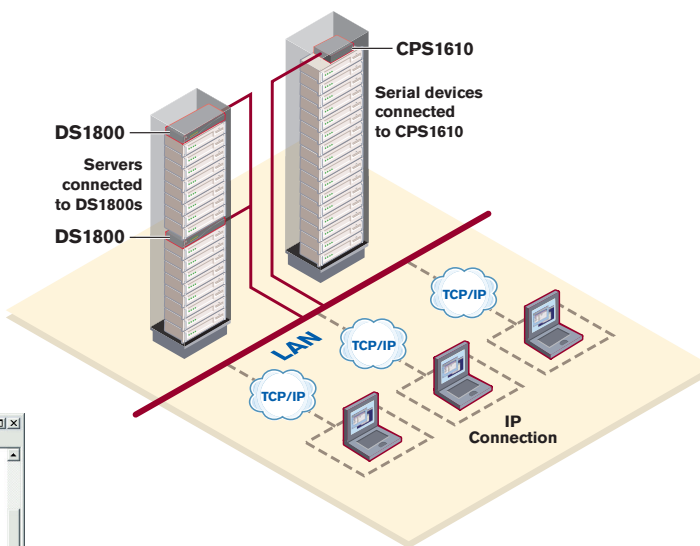
The remote control software approach suffers from several disadvantages. Software must be installed on each platform, creating computing overhead as well as administrative and other burdens. Such software does not provide BIOS-level access to servers. This means, for example, that administrators are not able to reboot devices remotely. They are also unable to initiate power cycles and interact with devices during power up sequences. Routers and other devices must also be excluded from such remote control and management schemes.

Other remote access tools can also use IP networks, but closer examination reveals management, user and scalability limitations common to standalone solutions. For example, while information can be examined locally and even accessed directly, such systems cannot provide authentication, centralized audit logs or device visibility across the network. By contrast, IP-based KVM systems simplify administration of remote servers-and other devices-by enabling one-to-many control of computers, network hardware, and even serial devices through simple Web or client-based software control consoles. Instead of software on the remote unit, all that's required is an IP address. With such software, administrators can view and control all devices through a single standard interface.

As shown in the illustration, Avocent's DS1800 KVM OVER IP™ network appliance supports multi-platform server environments. The CPS network appliance supports Serial Over IP access for network devices such as power distribution units and routers. All connected devices can be accessed through Avocent's DS management software.



DSView



Finally, combined digital and analog KVM switching systems not only offer the advantages of standards-based remote management but also the benefits of local analog control. This gives network administrators the flexibility to control such serial devices as routers and Unix servers as well as graphical server platforms at the device location, the NOC or anywhere.

Key criteria for cost-justification

Key elements of cost-benefit are the ability of IP-based KVM switching systems to leverage the existing IP network and take advantage of the Windows architecture, minimizing infrastructural, training and support costs. Other cost-justification criteria include control, scalability, security, space utilization, and even employee recruiting and overtime costs.

After implementing an Avocent KVM OVER IP switching system, Warranty Corporation of America (WaCA) determined that its payback period was less than six months. Reuters found that 80% of the server problems that occur on their network can be resolved from the administrator's desk, freeing-up critical staff time. Gwinnett Health System immediately removed 24 sets of keyboards, monitors and mice from their 92-server network, significantly reducing clutter and freeing up valuable data center space. PSCU Financial Services found that a KVM OVER IP switching system not only improved efficiency in the data center, but improved engineer morale by allowing engineers to resolve off-hours problems from home, rather than having to drive to the data center.

Avocent KVM OVER IP systems enable administrators to achieve flexible centralized control. No longer do technicians have to be dispatched to remote locations for service or other action - all they need is access to a Web browser. It is even possible to add servers with a click of a mouse while supporting BIOS-level control of almost any number of servers or serial devices. The resultant savings in time and personnel can be substantial.

Avocent KVM OVER IP systems can also be justified in terms of helping to enable lights-out operations. Scalability generates other ROI benefits. These systems can easily accommodate growth in devices and users without time-consuming and costly reconfiguration. Such scalability assumes greater importance during an era of mergers and acquisitions as well as supplier enablement.

Enhanced security is harder to measure, but increasingly valuable. Users can have varying levels of access and control, which is especially useful when outside contractors are required. The Windows NT security model minimizes risks from intrusions or unauthorized access. Chronological audit logs that track users and activities can also be used for security. Network downtime can cost companies hundreds of thousands of dollars - per minute. The centralized control and adherence to the IP standard offered by an Avocent KVM OVER IP system speeds troubleshooting. Downtime is minimized, especially compared to the difficulty of isolating problems within proprietary implementations.

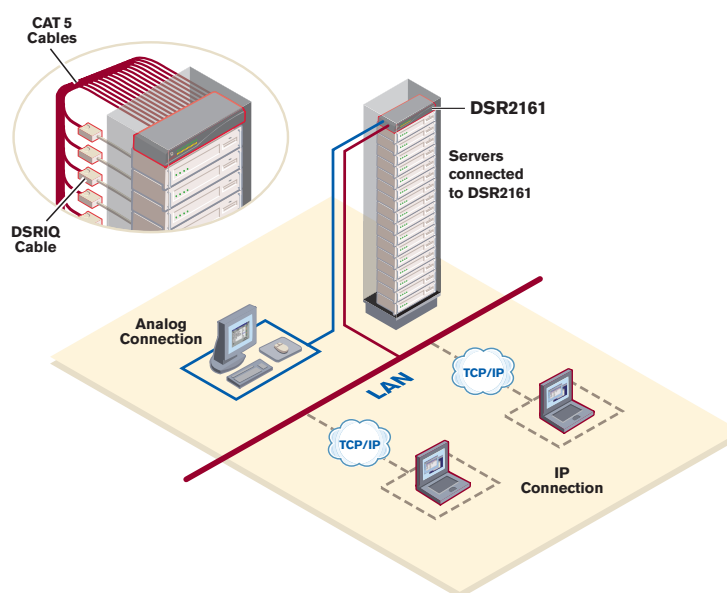
Additionally, digital IP-based KVM systems are inherently more reliable than electromechanical KVM systems. Previous KVM implementations were characterized by unwieldy cable tangles. IP-based connectivity allows standard KVM or CAT 5 cables to be used for long haul cabling, freeing valuable space and simplifying connectivity within high-density environments. IP-based KVM systems are also rack-optimized, which means they can be used with any standard shelving scheme.

Finally, network administrators with an eye on the future must also examine migration capabilities to accommodate network and other advancing technologies. Some KVM products may work well today, but are unable to cope with technology advances without forklift upgrades. By contrast, IP will be a communications standard for the foreseeable future. As long as a device can accommodate an IP address, it can be controlled and monitored with an Avocent digital KVM OVER IP system. For additional future proofing, Avocent KVM OVER IP firmware and software is flash-upgradeable.

The choice is clear

Administrators understand that centralization and standardization represent the best ways to deal with network growth and complexity. A vital element of any centralization and standardization strategy is a digital IP-based KVM system. By incorporating IP and Windows standards, Avocent KVM OVER IP systems enable administrators to expand their reach over distributed systems, improve security and reduce costs and downtime. Telnet appliances extend that capability to connected serial devices. Alternative solutions are either incomplete or involve proprietary implementations or substantial administrative and other overhead. Avocent KVM OVER IP switching systems can be cost-justified by their ability to improve reliability and increase reach and control within existing IP infrastructures. As a result, network administrators who are looking toward the future are looking closely at IP-based KVM switching systems.

As shown in the illustration, the Avocent DSR2161 KVM OVER IP™ network appliance provides both digital and analog connectivity for local and remote IP access from a single source. For reduced cable bulk, the DSR2161 works with the DSRIQ CAT 5 designed cable interface.

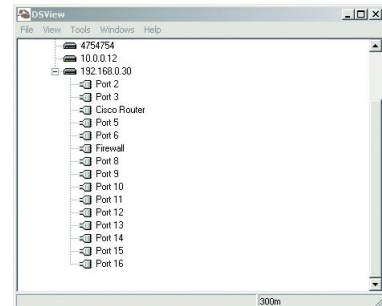
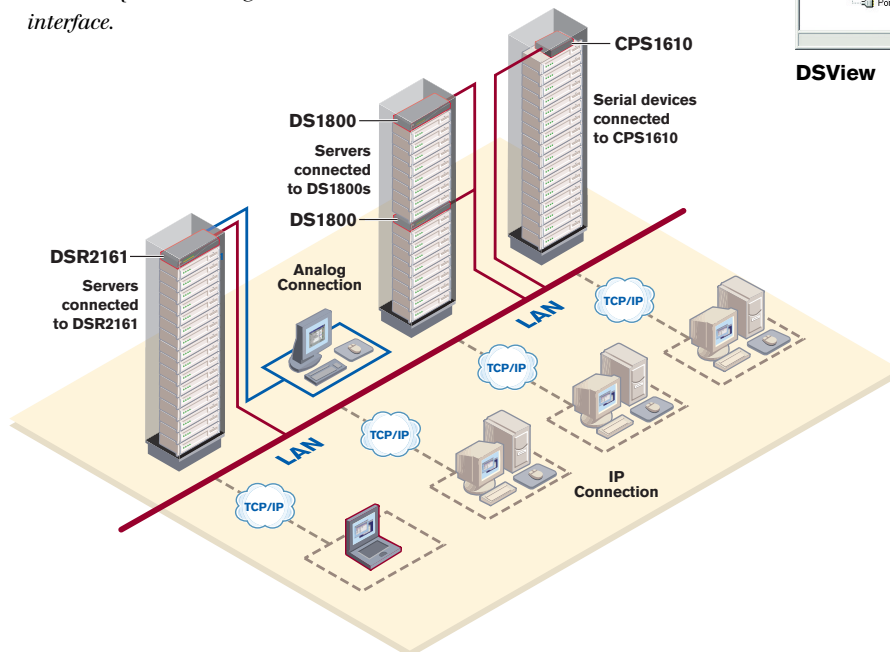


Avocent products for the enterprise

DS Series

Designed for demanding IT environments, Avocent's DS Series offers reliable digital and analog switching solutions for multi-platform, multi-location and multi-device access and control. Using TCP/IP connectivity, the DS Series simplifies access to servers and other network devices by putting the entire data center at your fingertips. From access at the rack to access at your desk, the DS Series provides an unmatched solution for today's data center environments. The DS Series includes DSView, DSR800, DSR1161, DSR2161, DSR4160, DS1800, CPS and SPC.

As shown in the illustration, the Avocent DSR2161 KVM OVER IP™ network appliance provides both digital and analog connectivity for local and remote IP access from a single source. For reduced cable bulk, the DSR2161 works with the DSRIQ CAT 5 designed cable interface.

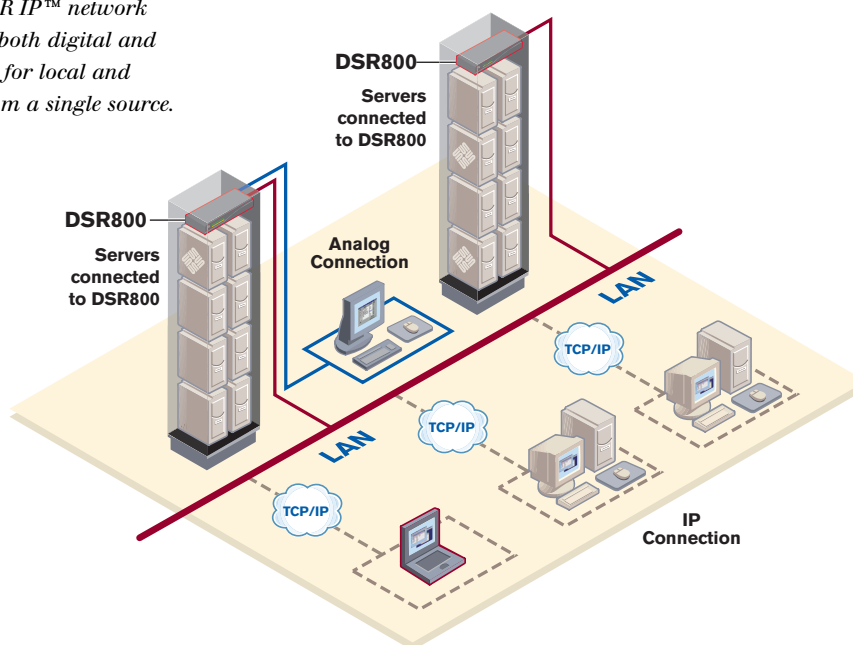


DSView

DSR™

The DSR network appliances combine the power of digital and analog technology for IP or rack level access and control of data center devices. The DSR suite is comprised of the 8-port DSR800 and three 16-port rack mountable KVM network appliances: DSR1161, DSR2161 and DSR4160. The DSR800 and DSR1161 are single user digital-analog solutions that provide local and KVM OVER IP™ access. The DSR2161 offers digital-analog solutions with one local port for access at the rack and two Ethernet ports for IP access. The DSR4160 all digital KVM switch contains four Ethernet ports and provides IP connectivity from anywhere in the world. The DSR4160 is a scalable, flexible solution for growing IT environments. The DSR1161 and DSR2161 work with Avocent's patented OSCAR® GUI on-screen display for access and control at the rack and use DSView for IP access. The DSR4160 all digital solution works with DSView for point-and-click control to any connected device, using industry standard TCP/IP (Ethernet) connections.

As shown in the illustration, Avocent's DSR800 KVM OVER IP™ network appliance provides both digital and analog connectivity for local and remote IP access from a single source.



DS1800

DS1800 is a digital KVM switching solution that provides administrators complete access to an unlimited number of servers or devices in their network, from any location. It leverages existing networking infrastructure to transmit KVM signals, rather than relying on proprietary KVM cabling. DS1800 features unlimited scalability and advanced security features as well as an easy-to-use GUI interface.

CPS Series (to access serial devices)

The Avocent CPS is an appliance-like Telnet server that provides administrators with a centralized means to access serially-managed devices through access at the rack or access over IP connections. A single 100BaseT port provides network connectivity and 8 or 16 serial ports, depending on the CPS appliance, provide attachment to managed devices. In conjunction with DS1800 and other Avocent solutions, the CPS product line offers a full range of KVM and console connectivity to servers and serial devices in the data center.

SPC Series (for power management)

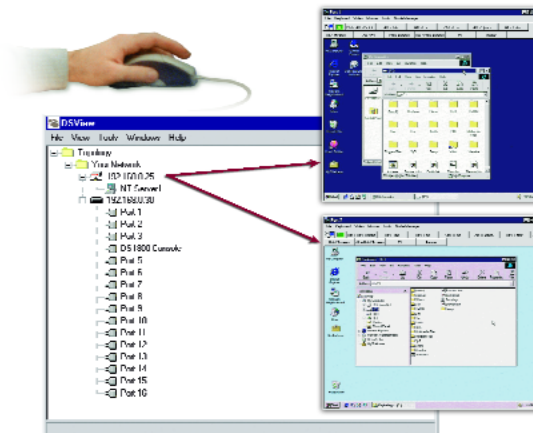
As part of Avocent's DS Series, the SPC power management solution provides the ability to control power to data center devices over TCP/IP connections. When combined, the CPS network appliance and the SPC power distribution device provide secure access and power monitoring to any connected network device. The SPC power management solution includes power sequencing, power distribution and power measurement. SPC power devices are available in 8 and 16 outlet models.

DS Management Software

The cornerstone of the DS Series, DSView is Avocent's management software that provides point-and-click control of devices connected to a DS Series appliance. The next generation DSView 2.0 software offers enhanced system security and increased user convenience with a consolidated view of all connected data center devices via the DSR, DS1800 and CPS network appliances:

- Provides convenient browser-based access to targeted devices from anywhere
- Provides cross platform client support
- Telnet viewer simplifies troubleshooting and debugging server problems
- Central authentication and audit provides added system security
- Allows secure authentication with HTTPS, 128bit encryption
- No special client software to install or maintain

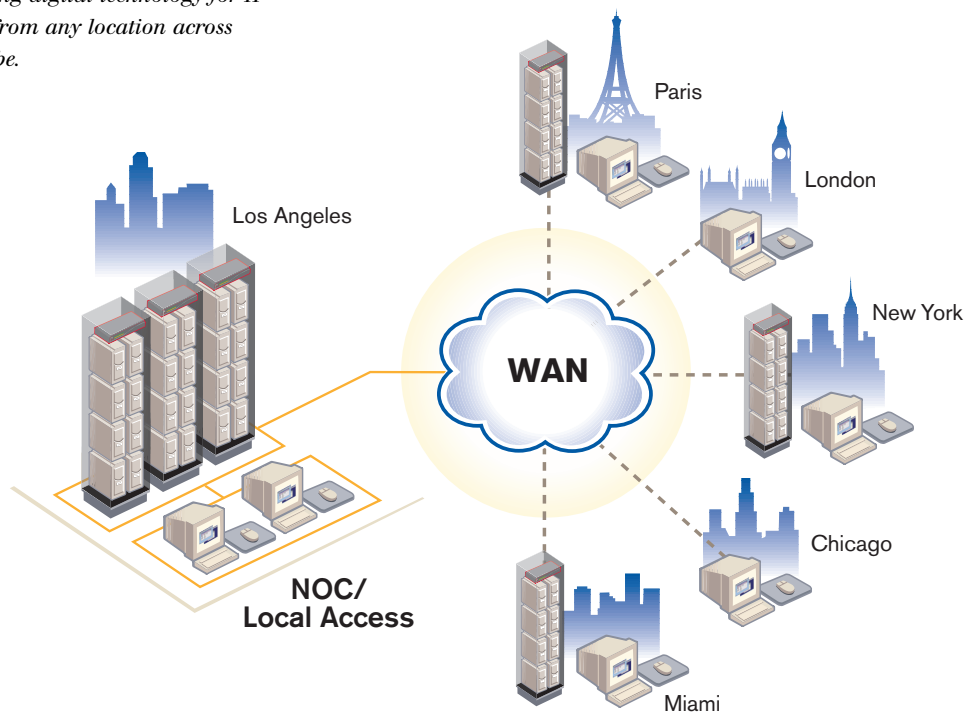
As shown in the illustration, Avocent's advanced DSView centralized management tool provides easy access to any connected device for monitoring and controlling the managed devices.



AutoView®

AutoView 1000R and AutoView 2000R KVM switches expand the AutoView product line with combined local KVM switching and remote IP-based access in a single switch. With end-to-end CAT 5 connectivity, convenient on-screen management and flexible access, AutoView is an all-in-one KVM analog and digital switching solution. AutoView provides an analog port for local access and an Ethernet port for extended and remote IP-based access. Using IP connectivity, AutoView adds an extended user anywhere in the data center or a remote user from anywhere across the globe. For CLICK and CONNECT™ control of multi-platform servers, AVWorks™ administration software is bundled with each switch.

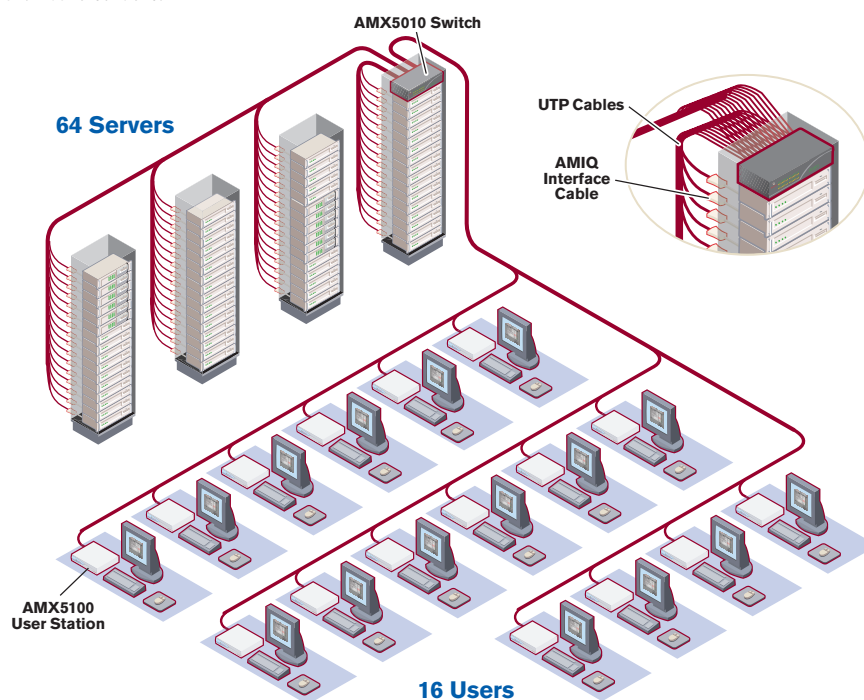
As shown in the illustration, this IP-based KVM switching system eliminates distance limitations by providing digital technology for IP access from any location across the globe.



AMX™

The AMX5010 is a 16x64 (16 user/64 server) analog matrix switching solution that utilizes Avocent's field-proven technology to provide unmatched advancements in increased user access and efficient scalability. It increases the number of users with simultaneous access and its highly scalable architecture makes it easy for administrators to add and support more servers. The AMX5010 supports all major server platforms. Avocent's advanced AMWorks™ software is also included with each AMX5010 switch for central administration.

As shown in the illustration, Avocent's AMX5010 (16 user/64 server) analog matrix switching solution provides increased user access and efficient scalability so that administrators can easily add and support more servers.



About Avocent Corporation

Avocent (NASDAQ: AVCT) is the leading worldwide supplier of KVM (keyboard, video and mouse) switching, remote access and serial connectivity solutions that provide IT managers with access and control of multiple servers and network data center devices. Avocent's KVM solutions are distributed by the world's largest server manufacturers and installed in Fortune 100 companies around the world. Visit www.avocent.com for more details.



Corporate Headquarters
4991 Corporate Drive, Huntsville, AL 35805
TEL 800.286.2368 FAX 256.430.4030
www.avocent.com

Avocent, the Avocent logo, The Power of Being There, KVM OVER IP, AMX, AutoView, OSCAR, DSView, AMWorks, DSR, Click and Connect, AVWorks and SwitchView are trademarks or registered trademarks of Avocent Corporation or its affiliates. All other marks are the property of their respective owners. Copyright © 2003 Avocent. All rights reserved.